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SCIENTIFIC DATA REVIEWS
EPA SERIES 361

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

May 2, 2001

MEMORANDUM

Subject: Reregistration of **Mancozeb**: Wheat Crop Field Trial Data; Chemical No. 14504; DP Barcode D255366; MRID No.: 44802501.

From: Christine L. Olinger, Chemist
Reregistration Branch I
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A handwritten signature in black ink, likely belonging to Christine L. Olinger.

Through: Whang Phang Ph.D., Branch Senior Scientist
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and

Christina Swartz, Chemist
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To: Anne Overstreet
Special Review and Reregistration Division (7508W)

The Mancozeb Task Force has submitted a crop field trial study to support the reregistration of the fungicide mancozeb for use on wheat. This study has been reviewed by Dynamac Corporation under supervision of HED and the review has been revised to reflect Division policies.

No additional magnitude of residue data are required to support the reregistration of mancozeb on wheat.

cc: COlinger, Reg. Std. File,
7509C:RRB1:CLOlinger:clo:CM#2:Rm 722J:305-5406:4/11/01
RDI: CSwartz: 4/19/01; WPhang: 04/30/01

MANCOZEB
PC Code 014504; Case 0643
(DP Barcode D255366)

Registrant's Response to Residue Chemistry Data Requirements

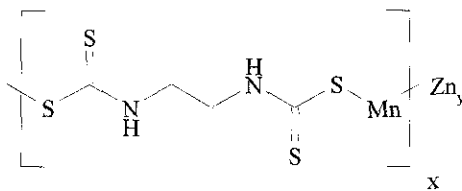
January 11, 2000

Contract No. 68-W-99-053

Submitted to:
U.S. Environmental Protection Agency
Arlington, VA

Submitted by:
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The Dynamac Building
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MANCOZEB



PC Code 014504; Case 0643

(DP Barcode D255366)

REGISTRANT'S RESPONSE TO RESIDUE CHEMISTRY DATA REQUIREMENTS

PRESENT SUBMISSION

The Mancozeb Task Force (with members consisting of Elf Atochem North America, Inc., Griffin LLC, and Rohm and Haas Company) has submitted the results of a study (1999; MRID 44802501) pertaining to the magnitude of mancozeb residues of concern in/on wheat commodities. The submitted data are evaluated herein for their adequacy in fulfilling residue chemistry data requirements for the reregistration of mancozeb.

BACKGROUND

Mancozeb was the subject of a Reregistration Standard Guidance Document dated 3/87; the Residue Chemistry Science Chapter of the Guidance Document was dated 9/10/86. The Residue Chemistry Chapter Update of the Mancozeb Reregistration Standard was issued on 8/11/92.

HED has reviewed a protocol (DP Barcode D216884, S. Hummel, 1/23/96) for the conduct of mancozeb residue field trials on many food/feed crops including wheat. With respect to the reregistration requirements for magnitude of the residue in wheat commodities, the protocol review concluded that: "Twelve additional field trials are needed for wheat, to be translated to the other grains, one in Region 2, three in Region 5, three in Region 7, and five in Region 8. Samples of wheat grain, hay, and straw must be collected. Data are not needed for wheat forage or aspirated grain fractions. Our conclusions assume that the PHI will be changed from 26 days to "Feekes Growth Stage 10.5, but not less than 26 days." Two decline studies are required."

HED subsequently issued a protocol revision (DP Barcode D232549, S. Funk, 2/26/97) for the conduct of wheat field trials following an inquiry made by the Task Force regarding the number of applications required to generate residue data for wheat hay. The Task Force inquired whether only two applications (the label permits up to three applications) of a registered mancozeb formulation should be made on wheat hay because this commodity is to be harvested at or before

the soft dough stage which is typical of normal agricultural practices. HED concluded that three applications of mancozeb at 1.6 lb ai/A/application are required for wheat hay. The Task Force was informed that they may not reduce the number of applications to two based on the premise that the third application is typically made after the hay growth stage specified in Table 1 of OPPTS GLN 860.1000.

The qualitative nature of the residue in plants and livestock is adequately understood. Mancozeb and ethylenethiourea (ETU) are the residues of concern. Tolerances for residues of mancozeb in/on raw agricultural and processed commodities are currently expressed in terms of the residues of a fungicide which is a coordination product of zinc ion and maneb (manganous ethylene bisdithiocarbamate) containing 20 percent manganese, 2.5 percent zinc, and 77.5 percent ethylene-bisdithiocarbamate (the whole product calculated as zinc ethylenebisdithiocarbamate) [40 CFR §180.176 and §180.319]. The Agency has recommended that the tolerance expression for mancozeb be revised to include residues of ETU.

The current tolerance enforcement method according to PAM, Vol. II is a colorimetric method (designated as Method III), based on the Keppel method (JAOAC, 54:528-532). Codex limits for EBDC fungicides are grouped under dithiocarbamates. Maximum residue limits (MRLs) for the dithiocarbamates are established for several commodities resulting from the use of mancozeb, maneb, metiram, propineb, thiram, and ziram and are currently expressed as ppm carbon disulfide. Currently, no Codex MRLs are established or prior MRLs have been revoked for residues of ETU for any commodity. Harmonization of the U.S. tolerances with Codex MRLs is impractical at the present time.

CONCLUSIONS AND RECOMMENDATIONS

OPPTS GLN 860.1340: Residue Analytical Methods

1. Samples of wheat from the subject study were analyzed for residues of mancozeb using a GC method with flame photometric detection (Morse Laboratories SOP Meth-78). Residues of ETU were determined using HPLC with electrochemical detection (Morse Laboratories SOP Meth-17, Revision #3). The limits of quantitation (LOQs) were 0.05 ppm for mancozeb and 0.01 ppm for ETU. These methods are adequate for the purpose of data collection. During method validation, the average recoveries of mancozeb and ETU were 88% and 72%, respectively. During concurrent analysis of collected samples, the average recoveries of mancozeb and ETU were 88% and 70%, respectively.

OPPTS GLN 860.1380: Storage Stability Data

2. The registrant conducted a concurrent storage stability study to validate the storage conditions and intervals of samples collected from the wheat field trials. Residues of mancozeb were relatively stable in/on wheat grain after 95 days and wheat straw after

112 days. Residues of ETU were relatively stable in/on wheat grain for up to 113 days but declined by ~20% in/on wheat straw after 140 days. HED will take into consideration the observed decline in residues resulting from freezer storage during tolerance reassessment. The available storage stability data for wheat straw will be translated to wheat hay.

OPPTS GLN 860.1500: Crop Field Trials

Wheat

- 3a. Wheat grain: The submitted residue data for wheat grain are acceptable. They indicate that the combined residues of mancozeb and ETU in/on wheat grain harvested 34-46 days following the last of three broadcast applications, with 6-12 day retreatment intervals, of the 75% DF formulation at ~ 1.6 lb ai/A/application (1x) will not exceed the established tolerance of 5.0 ppm. The combined residues of mancozeb and ETU in/on 24 samples of treated wheat grain were <0.06-<0.748 ppm.
- 3b. Residue data reviewed in the Mancozeb Update indicate that the combined residues of mancozeb and ETU in/on wheat grain harvested 36-46 days following a treatment schedule reflecting the maximum use pattern were <0.06-<0.13 ppm. Based on the aggregate of data reflecting 1x, HED recommends that the established tolerance for the combined residues of mancozeb and ETU in/on wheat grain be reassessed at 1.0 ppm.
- 4a. Wheat straw: The submitted residue data for wheat straw are acceptable. They suggest that the established tolerance of 25 ppm for wheat straw may be too low to support the currently maximum registered use pattern. The combined residues of mancozeb and ETU were <0.174-27.426 ppm in/on 24 samples of wheat straw harvested 34-46 days (approximately when plants are in the Feekes Growth Stage 10.5) following the last of three broadcast applications, with 6-12 day retreatment intervals, of the 75% DF formulation at ~1.6 lb ai/A/application.
- 4b. Residue data reviewed in the Mancozeb Update indicate that the combined residues of mancozeb and ETU in/on wheat straw harvested 36-46 days (approximately when plants are in the Feekes Growth Stage 10.5) following a treatment schedule reflecting the maximum use pattern were 3.09-25.01 ppm. Based on the aggregate of data reflecting 1x and adjusting for decline of ETU residues resulting from storage, HED recommends that the established tolerance for the combined residues of mancozeb and ETU in/on wheat straw be raised from 25.0 ppm to 30.0 ppm.
5. Wheat hay: The submitted residue data for wheat hay are acceptable. They suggest that a tolerance for wheat hay should be established at 50 ppm to support the currently maximum registered use pattern. The combined residues of mancozeb and ETU were 2.50-47.0 ppm in/on 24 samples of wheat hay harvested 4-31 days (approximately when plants are in the Feekes Growth Stage 10.5) following the last of three broadcast applications, with 6-12 day retreatment intervals, of the 75% DF formulation at ~1.6 lb ai/A/application.

6. Wheat forage and aspirated grain fractions: As concluded in the protocol review, residue data on wheat forage are not required. Mancozeb residues of concern are not expected in wheat forage because mancozeb is typically not applied before wheat plants reach the "foraging" stage. Residue data on aspirated grain fractions are also not required because mancozeb is applied before the reproductive stage. HED notes that in the current submission, the majority of wheat grain samples treated at 1x bore nondetectable residues of mancozeb (<0.05 ppm) and ETU (<0.01 ppm).
7. Wheat decline data: The additional residue decline data requested in the protocol for wheat are no longer required. Since the Task Force has submitted decline data for numerous representative crops, the Agency agrees with the registrants that enough decline data have been generated to support uses on wheat (CBRS No. 17530, DP Barcode D227492, F. Fort, 9/26/96).

DETAILED CONSIDERATIONS

OPPTS GLN 860.1340: Residue Analytical Methods

Samples of wheat commodities from the submitted field trial studies were analyzed for residues of mancozeb and ETU by Morse Laboratories, Inc. (Sacramento, CA). Mancozeb residues were determined using a GC method with flame photometric detection (Morse Laboratories SOP Meth-78), and ETU residues were determined using an HPLC method with electrochemical detection (Morse Laboratories SOP Meth-17, Revision #3). The LOQs were 0.05 ppm for mancozeb and 0.01 ppm for ETU. Raw data, sample calculations, and representative chromatograms were submitted. Brief discussions of the methods follow.

Mancozeb method: The method involved the conversion of EBDC residues to carbon disulfide (CS₂) which was quantitated by GC/FPD. Briefly, residues were extracted with 10% EDTA, 8 N HCl, and 3% stannous chloride solution. The mixture was reacted for 2 hours in a boiling water bath and then maintained at 100 C for analysis. An aliquot of the headspace was analyzed by GC/FPD for CS₂.

ETU method: Briefly, samples were combined with water, and the pH was adjusted to 11-12 with ammonium hydroxide. Sodium chloride, Celite, and ethanol were added, and the mixture was filtered through Celite. Water was added, and the pH was adjusted (if necessary) to 7-9. The extract was concentrated by rotary evaporation and applied to an alumina column; residues were eluted with ethanol:chloroform (6:94, v:v). The eluate was concentrated and redissolved in water for quantitation by HPLC using a Zorbax RX-C8 column, an isocratic mobile phase of 0.5% methanol in 0.02 M phosphoric acid, and electrochemical detection.

The laboratory validated the methods prior to analysis of the field trial samples. Two untreated samples of wheat hay, grain, and straw were fortified with mancozeb and ETU. In addition, concurrent method recovery data were provided using untreated samples of wheat hay, grain, and straw samples collected from the field trials. The results of the method validation and concurrent method recovery analyses are presented in Table 1. HED concludes that the analytical methods used to measure residues of mancozeb and ETU are adequate for data collection based on overall average recoveries.

Table 1. Method validation and concurrent method recoveries of mancozeb and ETU from fortified untreated samples of **wheat** (hay, grain, and straw) from the submitted field trial studies.

Matrix	Mancozeb			ETU		
	Fortification Levels (ppm)	% Recovery ^a	Mean \pm s.d. ^b	Fortification Levels (ppm)	% Recovery ^a	Mean \pm s.d. ^b
Method Validation Recovery						
Hay	0.05, 2.0	76, 85	[81 \pm 6.4]	0.01, 0.25	55; 76	[66 \pm 14.8]
Grain	0.05, 2.0	82; 126	[104 \pm 31.1]	0.01, 0.25	66; 83	[75 \pm 12.0]
Straw	0.05, 2.0	73, 82	[78 \pm 6.4]	0.01, 0.25	71, 78	[75 \pm 4.9]
Concurrent Method Recovery						
Hay	0.05	78-109 (5)	[95 \pm 13]	0.01	59-69 (5); 77, 79	[69 \pm 7.4]
	2.0	77, 101	[87 \pm 17]	0.25	68; 70-81 (4)	[75 \pm 5.8]
	10	87	87	1.0	82, 94	[88 \pm 8.5]
	45	75	75	---	---	---
	40	88	88	---	---	---
Grain	0.05	75-98 (5)	[86 \pm 8.6]	0.01	39-68 (4); 80	[63 \pm 15.0]
	2.0	85-91 (4)	[87 \pm 2.9]	0.25	64, 67; 80-84 (3)	[75 \pm 9.0]
	3.0	87	87	---	---	---
Straw	0.05	73-110 (5)	[92 \pm 16]	0.01	38; 70-94 (4)	[71 \pm 20]
	0.5	80	80	0.25	51-66 (4); 75	[62 \pm 9.8]
	2.0	90	90	---	---	---
	5.0	72, 81	[76 \pm 6.4]	---	---	---
	30	94	94	---	---	---

^a Recovery values outside the acceptable range of 70-120% are listed separately; each value represents one sample unless otherwise indicated in parentheses.

^b Overall average recovery \pm standard deviation in brackets.

OPPTS GLN 860.1380: Storage Stability Data

Storage intervals and conditions of samples: The registrant maintained the integrity of wheat commodity samples collected from the field trials with proper sample-handling procedures. Within 2-6 hours of sampling, the harvested samples were put on dry ice or into freezers and remained frozen until residue analysis. The total storage intervals (between harvest and analysis) of treated wheat samples analyzed for mancozeb residues were 63-96 days for wheat grain, 65-94 days for wheat hay, and 63-117 days for wheat straw. The total storage intervals of treated wheat samples analyzed for ETU residues were 62-116 days for wheat grain, 63-118 days for wheat straw, and 77-134 days for wheat hay.

Storage stability data: The protocol review (DP Barcode D216884, S. Hummel, 1/23/96) concluded that no additional storage stability studies will be required for the crops discussed in the protocol provided the laboratory analyzing the samples for each commodity has analyzed the same closely related commodity within the past 5 years with satisfactory storage stability. HED notes that the performing laboratory, Morse Laboratories, has previously conducted analyses of RAC samples collected from previous mancozeb field trials.

The protocol review additionally concluded that no additional storage stability studies will be needed for the crops addressed in the protocol other than onions and sugar beets, provided samples are analyzed for ETU within 2 weeks of harvest and mancozeb within 30 days of harvest. The protocol review stated that if samples for ETU analysis are held more than 2 weeks after harvest, or samples for mancozeb analysis are held more than 30 days after harvest, concurrent storage stability studies will be needed.

Because frozen wheat RAC samples were stored for intervals longer than those specified in the protocol review, the registrant conducted a concurrent storage stability study. Untreated samples of wheat grain and straw were separately fortified with mancozeb at 5.0 ppm and with ETU at 0.5 ppm. Following fortification, samples were stored frozen at -20 C. Subsamples were taken at various storage intervals and analyzed for residues of mancozeb and ETU. The results of storage stability studies are presented in Table 2. The freezer storage stability data indicate that residues of mancozeb were relatively stable in/on wheat grain after 95 days and wheat straw after 112 days. Residues of ETU were relatively stable in/on wheat grain for up to 113 days but declined by ~20% in/on wheat straw after 140 days. HED will take into consideration the observed decline in residues resulting from freezer storage during tolerance reassessment.

Table 2. Storage stability and concurrent method recoveries of mancozeb and ETU from samples of wheat grain and straw fortified separately with mancozeb at 5.0 ppm and with ETU at 0.5 ppm, and stored frozen at -20 C.

Matrix	Storage Interval, days	Fresh Fortification Recovery, % ^a	Storage Stability Recovery, %	Corrected Storage Stability Recovery, % ^b
Mancozeb				
Grain	0	83, 84, 85, 86 (85)	--	--
	32	79, 81 (80)	75, 78	94, 98
	95	77, 79 (78)	79, 86	101, 110
Straw	0	81, 82, 82, 84 (82)	--	--
	30	78, 91 (85)	85, 91	100, 107
	112	71, 80 (76)	54, 55	71, 72
ETU				
Grain	0	95, 95, 99, 99 (97)	--	--
	30	91, 92 (92)	89, 92	97, 100
	91	83, 93 (88)	87, 89	99, 101
	113	77, 98 (88)	95, 96	108, 109
Straw	0	82, 85, 88, 88 (86)	--	--
	30	66, 70 (68)	48, 53	71, 78
	90	73, 81 (77)	41, 46	53, 60
	140	80, 86 (83)	47, 53	57, 66

^a Average fresh fortification recovery values are noted in parentheses.

^b Calculated by dividing the storage stability recovery by the mean fresh fortification recovery.

OPPTS GLN 860.1500: Crop Field Trials

Wheat

Established tolerances: Tolerances of 5.0 ppm and 25.0 ppm have been established for residues of the fungicide mancozeb, a coordination product of zinc ion and maneb (manganous ethylene bisdithiocarbamate) containing 20 percent manganese, 2.5 percent zinc, and 77.5 percent ethylene-bisdithiocarbamate (the whole product calculated as zinc ethylenebisdithiocarbamate) in/on wheat grain and straw, respectively [40 CFR §180.176].

Use patterns registered to members of the Mancozeb Task Force: There are several mancozeb end-use products registered to the Mancozeb Task Force which are permitted for use on wheat; these products are listed in Table 3.

Table 3. Mancozeb end-use products registered to the Mancozeb Task Force and which are permitted for use on wheat.

EPA Reg. No.	Formulation	Label Acceptance Date ^a	Product Name
Rohm and Haas Company			
707-78	80% WP	8/15/97	Dithane —45® Agricultural Fungicide
707-156	4 lb/gal FIC	8/15/97	Dithane F-45® Flowable Mancozeb Agricultural Fungicide
707-162	3.48 lb/gal FIC	10/11/94	Dithane —45® Flowable M Agricultural Fungicide
707-179	70% DF	10/11/94	Dithane® DF/70 Agricultural Fungicide
707-180	75% DF	8/15/97	Dithane DF® Agricultural Fungicide
707-241	80% WP	8/15/97	Dithane® WSP Agricultural Fungicide
Griffin Corporation (mancozeb products transferred from E. I. du Pont de Nemours and Co.)			
1812-360	15% DF	12/19/97	ManKocide® Fungicide/Bactericide
1812-414 (transferred from 352-449)	75% DF	2/4/98	Manzate® 200 DF Fungicide
1812-415 (transferred from 352-341)	80% WP	9/18/97	Manzate® 200 Fungicide
1812-416 (transferred from 352-398)	4 lb/gal FIC	2/4/98	Manzate® 200 Flowable Fungicide
Elf Atochem North America, Inc.			
4581-358	80% WP	9/10/97	Penncozeb® 80WP Fungicide
4581-370	75% DF	9/10/97	Penncozeb® 75DF 75% Dry Flowable Fungicide

The 80% WP, 15%, 70% and 75% DF, and 3.48 and 4 lb/gal FIC formulations are registered for a maximum application rate of 1.6 lb ai/A/application, a maximum of 3 applications or 4.8 lb ai/A/season, at an application interval of 7-10 days, using ground or aerial equipment. Applications are to be made in a minimum of 2-3 gal/A of water when using aerial equipment; aerial applications in CA are to be made in a minimum of 5 gal/A (Rohm and Haas products only). Applications are to be made in a minimum of 20 gal/A of water when using ground equipment (Griffin products only). For all other products, a minimum application volume for ground equipment is not specified. A 26 day PHI has been established. The grazing of livestock in treated areas prior to harvest is prohibited. Application after Feekes growth stage 10.5 or heading is prohibited (Griffin and Elf Atochem products only). HED notes that mancozeb uses on wheat, as registered to the members of the Mancozeb Task Force, reflect the maximum use pattern cited in the EBDC PD 4 as well as the HED protocol review.

The 80% WP, 15%, 70%, and 75% DF, and 3.48 and 4 lb/gal FIC formulations are also registered for treatment of wheat seeds at 0.375-0.17 lb ai/100 lb of seed. The use of treated seed for food, feed, or oil purposes is prohibited.

Discussion of data: The Mancozeb Task Force has submitted field trial data (1999; MRID 44802501) depicting mancozeb residues of concern (mancozeb and ETU) in/on wheat commodities. Twelve field trials were conducted during the 1997 growing season in GA (Region 2; 1 trial), KS (Region 8; 1 trial), MN (Region 5; 1 trial), ND (Regions 5 and 7; 4 trials), NM (Region 8; 1 trial), OK (Region 8; 1 trial), SC (Region 2; 1 trial), and TX (Region 8; 2 trials). Wheat plants were treated with three foliar broadcast applications, with 6- to 12-day retreatment intervals, of the 75% DF formulation (EPA Reg. No. 707-180) at 1.519-1.653 lb ai/A/application (~1x the maximum registered seasonal rate) using ground equipment. Applications were made in 7.3-25.6 gal/A of water. Wheat hay was collected 4-31 days after the final application at late milk to early dough (Feekes' Stage 10.5). Wheat grain and straw were harvested at crop maturity, 34-46 days following the final application.

One control and duplicate treated samples were collected from each test plot. Information pertaining to handling and storage procedures of harvested samples is found in the "Storage Stability Data" section of this document. The harvested samples were analyzed for residues of mancozeb and ETU using the methods described in the "Residue Analytical Methods" section. Apparent residues of mancozeb were less than the LOQ (<0.05 ppm) in/on 11 untreated samples each of wheat grain, straw, and hay. Apparent residues of ETU were less than the LOQ (<0.01 ppm) in/on 12 untreated samples each of wheat grain, straw, and hay. One sample each of untreated wheat grain, straw, and hay bore detectable residues of mancozeb at 2.37 ppm, 0.082 ppm, and 0.052 ppm, respectively. The results of the field study are presented in Table 4.

Table 4. Residues of mancozeb and ETU in wheat grain, hay, and straw harvested 4-46 days following the last of 3 foliar applications of the 75% DF formulation at 1.519-1.653 lb ai/A/application (~1x the maximum seasonal rate).

Trial location (County) (EPA Region)	PHI (days)	Residues (ppm) ^a		
		Mancozeb	ETU	Combined
Grain				
Armstrong, TX (Region 8)	34	0.132, 0.170	<0.01, <0.01	<0.142, <0.180
McHenry, ND (Region 7)	35	0.091, 0.095	<0.01, <0.01	<0.101, <0.105
Dona Ana, NM (Region 8)	35	0.629, 0.738	<0.01, <0.01	<0.639, <0.748
Pulaski, GA (Region 2)	36	0.179, 0.213	<0.01, <0.01	<0.189, <0.223
Barnwell, SC (Region 2)	38	0.233, 0.236	<0.01, <0.01	<0.243, <0.246
McHenry, ND (Region 7)	42	<0.05, <0.05	<0.01, <0.01	<0.06, <0.06
Washita, OK (Region 8)	42	<0.05, <0.05	<0.01, <0.01	<0.06, <0.06
McHenry, ND (Region 7)	44	<0.05, <0.05	<0.01, <0.01	<0.06, <0.06

Table 4 (continued):

Trial location (County) (EPA Region)	PHI (days)	Residues (ppm) ^a		
		Mancozeb	ETU	Combined
Collinsworth, TX (Region 8)	44	<0.05, <0.05	<0.01, <0.01	<0.06, <0.06
Wilkin, MN (Region 5)	45	<0.05, <0.05	<0.01, <0.01	<0.06, <0.06
Pratt, KS (Region 8)	46	<0.05, <0.05	<0.01, <0.01	<0.06, <0.06
Richland, ND (Region 5)	46	<0.05, <0.05	<0.01, <0.01	<0.06, <0.06
Hay				
Pulaski, GA (Region 2)	4	36.5, 42.0	0.762, 0.544	37.3, 45.5
Barnwell, SC (Region 2)	5	29.6, 30.2	0.485, 0.481	30.1, 30.7
McHenry, ND (Region 7)	10	11.9, 13.8	0.166, 0.162	12.1, 14.0
McHenry, ND (Region 7)	11	2.88, 4.71	0.028, 0.031	2.91, 4.74
Dona Ana, NM (Region 8)	12	38.3, 46.4	0.487, 0.598	38.8, 47.0
McHenry, ND (Region 7)	13	2.51, 2.66	0.02, 0.02	2.53, 2.68
Washita, OK (Region 8)	14	11.1, 12.4	0.078, 0.155	11.2, 12.6
Armstrong, TX (Region 8)	14	7.42, 9.01	0.054, 0.036	7.47, 9.05
Collinsworth, TX (Region 8)	16	3.75, 3.82	0.020, 0.025	3.77, 3.84
Wilkin, MN (Region 5)	18	7.80, 7.92	0.048, 0.049	7.85, 7.97
Richland, ND (Region 5)	19	6.48, 7.68	0.034, 0.041	6.51, 7.72
Pratt, KS (Region 8)	31	2.48, 3.01	0.018, 0.018	2.45, 3.03
Straw				
Armstrong, TX (Region 8)	34	1.60, 2.39	<0.01, 0.011	<1.61, 2.40
McHenry, ND (Region 7)	35	1.25, 1.34	0.016, 0.014	1.27, 1.35
Dona Ana, NM (Region 8)	35	21.5, 27.1	0.240, 0.326	21.7, 27.4
Pulaski, GA (Region 2)	36	2.36, 3.87	0.024, 0.022	2.38, 3.89
Barnwell, SC (Region 2)	38	3.26, 4.92	0.047, 0.053	3.31, 4.97
McHenry, ND (Region 7)	42	0.186, 0.355	<0.01, <0.01	<0.187, <0.365
Washita, OK (Region 8)	42	0.297, 0.423	<0.01, <0.01	<0.298, <0.433
McHenry, ND (Region 7)	44	0.164, 0.194	<0.01, <0.01	<0.174, <0.204
Collinsworth, TX (Region 8)	44	0.215, 0.282	<0.01, <0.01	<0.225, <0.292
Wilkin, MN (Region 5)	45	0.219, 0.281	<0.01, <0.01	<0.229, <0.291
Pratt, KS (Region 8)	46	0.218, 0.432	<0.01, <0.01	<0.228, <0.442
Richland, ND (Region 5)	46	0.484, 0.566	<0.01, <0.01	<0.494, <0.576

^a Residues were not corrected for concurrent method recovery.

Geographic representation of data: Geographic representation is adequate. The protocol review specified that 12 wheat trials be conducted in Regions 2 (1 trial), 5 (3 trials), 7 (3 trials), and 8

(5 trials). In the current submission, 12 wheat trials were conducted in Region 2 (2 trials), 5 (2 trials), 7 (3 trials), and 8 (5 trials). One trial was lacking for Region 5. This was due to improper wheat growth stage resulting from inclement weather; therefore, one field test was moved from SD (Region 5) to ND (Region 7). The Task Force indicated that the ND trial could replace the SD trial with no impact on the integrity of the data because the agronomic practices between ND and SD are similar, and the two sites are in the same climatic and crop zones.

Study summary: The submitted residue data for wheat grain are acceptable. They indicate that the combined residues of mancozeb and ETU in/on wheat grain harvested 34-46 days following the last of three broadcast applications, with 6-12 day retreatment intervals, of the 75% DF formulation at ~1.6 lb ai/A/application (1x) will not exceed the established tolerance of 5.0 ppm. The combined residues of mancozeb and ETU in/on 24 samples of treated wheat grain were <0.06-<0.748 ppm.

Residue data reviewed in the Mancozeb Update indicate that the combined residues of mancozeb and ETU in/on wheat grain harvested 36-46 days following a treatment schedule reflecting the maximum use pattern were <0.06-<0.13 ppm. Based on the aggregate of data reflecting 1x, HED recommends that the established tolerance for the combined residues of mancozeb and ETU in/on wheat grain be reassessed at 1.0 ppm.

The submitted residue data for wheat straw are acceptable. They suggest that the established tolerance of 25 ppm for wheat straw may be too low to support the currently maximum registered use pattern. The combined residues of mancozeb and ETU were <0.174-27.4 ppm in/on 24 samples of wheat straw harvested 34-46 days (approximately when plants are in the Feekes Growth Stage 10.5) following the last of three broadcast applications, with 6-12 day retreatment intervals, of the 75% DF formulation at ~1.6 lb ai/A/application.

Residue data reviewed in the Mancozeb Update indicate that the combined residues of mancozeb and ETU in/on wheat straw harvested 36-46 days (approximately when plants are in the Feekes Growth Stage 10.5) following a treatment schedule reflecting the maximum use pattern were 3.09-25.01 ppm. Based on the aggregate of data reflecting 1x and adjusting for decline of ETU residues resulting from storage, HED recommends that the established tolerance for the combined residues of mancozeb and ETU in/on wheat straw be raised from 25.0 ppm to 30.0 ppm.

The submitted residue data for wheat hay are acceptable. They suggest that a tolerance for wheat straw should be established at 50 ppm to support the currently maximum registered use pattern. The combined residues of mancozeb and ETU were 2.50-47.0 ppm in/on 24 samples of wheat hay harvested 4-31 days (approximately when plants are in the Feekes Growth Stage 10.5) following the last of three broadcast applications, with 6-12 day retreatment intervals, of the 75% DF formulation at ~1.6 lb ai/A/application.

As concluded in the protocol review, residue data on wheat forage are not required. Mancozeb residues of concern are not expected in wheat forage because mancozeb is typically not applied before wheat plants reach the "foraging" stage. Residue data on aspirated grain fractions are also not required because mancozeb is applied before the reproductive stage. HED notes that in the current submission, the majority of wheat grain samples treated at 1x bore nondetectable residues of mancozeb (<0.05 ppm) and ETU (<0.01 ppm).

The additional residue decline data requested in the protocol for wheat are no longer required. Since the Task Force has submitted decline data for numerous representative crops, the Agency agrees with the registrants that enough decline data have been generated to support uses on wheat (CBRS No. 17530, DP Barcode D227492, F. Fort, 9/26/96).

AGENCY MEMORANDA CITED IN THIS REVIEW

CBRS No.: 17773
 DP Barcode: D232549
 Subject: Mancozeb. Magnitude of the Residue In/On Wheat Protocol Revision (OPPTS 860.1500).
 From: S. Funk
 To: P. Deschamp
 Dated: 02/26/97
 MRID(s): None

CBRS No.: 17530
 DP Barcode: D227492
 SUBJECT: Mancozeb. Registrant Question/Comments Concerning Residue Trials and Storage Stability Requirements for the Chemical Mancozeb. Case No. 0643. Chemical I.D. No. 014504.
 FROM: F. Fort
 TO: P. Deschamp
 DATED: 9/26/96
 MRID(s): None

CBRS No.: 15792
 DP Barcode: D216884
 SUBJECT: Mancozeb (014504). Reregistration Case No. 0643 Mancozeb Task Force Protocol-Field Trials on Apples, Asparagus, Bananas, Barley, Oats, Rye, Wheat, Cotton, Cranberries, Fennel, Grapes, Onions, Papayas, Peanuts, Pears, and Sugar Beets.
 FROM: S. Hummel

TO: V. Eagle-Kunst/W. Waldrop
DATED: 1/23/96
MRID(s): None

MASTER RECORD IDENTIFICATION NUMBERS

Citation for the MRID document referred to in this review is presented below.

44802501 Koppatschek, F. (1999) Magnitude of the Residues of Mancozeb in the Raw Agricultural Commodity (RAC), Wheat Hay, Seed and Straw, Following Three Sequential Applications of Mancozeb at 1.6 LB AI/Acre to Wheat Plants: Lab Project Number: 97ABG0105: METH-17: GL-13B. Unpublished study prepared by AgriBusiness Group, Inc. 472 p.